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ABSTRACT

There have been several recent works dealing with the Russian "root system." Most of these works operate on the claim that vocabulary-building in advanced Russian classes may be accelerated by a mastery of the systems of derivational morphology. Townsend's "Russian Word Formation," Gribble's "Russian Root List," and Beard's "Dynamic Glossing" (SEEJ 19,49-57) are all predicated on the assumption that knowing the roots, affixes, and rules of combination of Russian derived words will facilitate vocabulary-building. This paper reports on two experiments designed to test the validity of "root theory." In the first test, experimental subjects were given a list of Russian words sectioned into individual morphemes, while the control subjects received a list of the same words unsectioned in lower case type. It was found that the experimental subjects remembered more words on the recall tests. In the second experiment, all subjects were given the same list of new, unfamiliar words but which comprised morphemes occurring in the previous recall experiment. It was found that although the difference was not of statistical significance, the experimental group outperformed the control group in identifying the correct meaning of the new words in a fashion paralleling its performance on the recall test. (Author)

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THE EFFECTS OF MORPHOLOGICAL SYSTEMIZATION ON MEMORY RETENTION*

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Although it has long been assumed that learning a foreign language, especially a Slavic language like Russian, can be facilitated by a mastery of the system(s) of derivational morphology (Gribble 1973; Keller 1973; Townsend 1968; Wolkonsky 1967), apparently no studies on the actual effects of morphological systemization on short- or long-term memory retention have been conducted. The approach to vocabulary-building via morphological systemization is particularly appealing to the teacher of Russian, since due to the fact that Russian derivations are much more frequently self-generated than borrowed, there is more morphological consistency in the language than there is in Western IE languages. Moreover, since there are

far fewer English cognates in Russian than there are in Romance and Germanic languages, vocabulary-building represents a major impediment to learning Russian where it is but a minor problem elsewhere (cf. Beard 1975). Thus vocabulary-building has been perceived as a major language learning block to which morphological systemization ostensibly holds the key. The difficulty which has hindered significant investigation, of course, is that derivational morphology is not nearly so regular as is inflexional morphology—long since systemized in instructional methodology. But Apresyan 1974; Beard 1976; Chafe 1970 and others have begun to develop semantic approaches to lexicology which promise greater regularity ergo usefulness in vocabulary-building. For this reason it becomes even more appropriate to determine whether there is psychological substance to the so-called 'root theory'.

There has been much research recently conducted on the effects of experimenter-imposed organization on memory (Banks 1974; Barrett et al. 1975; Kreuger 1970; Roediger 1973; Rundus 1973 and Wortman 1975). If organized material is more easily stored and recalled than material without any definite pattern of organization, then students instructed in morphological analysis should possess just such an organizational format and one based on sound linguistic principles. This organizational format should serve well as a strategy for future learning, especially vocabulary-building, in at least two ways. First, words organized according to their constituent morphemes should be retained more readily since their constituents will

be interrelated in relevant ways. Second, a mastery of the morphemes which constitute words should provide the student with an interpretive device enabling her or him to decode newly encountered words quickly and effectively with less recourse to extraneous devices such as dictionaries. Two separate but related experiments were conducted to test the validity of these hypotheses.

A pilot study of memory retention in the preceding year had demonstrated that a list of about 10 Russian words and English correlates could be effectively (ca. 70%) memorized during three learning trials of 100 seconds each (10 seconds per entry). Thus the vocabulary learning test consisted of 10 words and correlates, each entered on a separate page of a test booklet. The pilot study also demonstrated the preferability of a didactice to a discovery procedure. The post-test questionnaire administered after the discovery-oriented pilot study produced strong evidence that some first-year Ss were confused rather than assisted by morphological sectioning. Therefore the instructions for the experimental groups in the two present experiments explained how the words and correlates in the test were both analysed into corresponding morphemes, i.e. 'units of meaning', to facilitate memorization. Instructions for the control groups explained only the procedure and noted that the test was a memory test. Finally, the pilot test administered in the first semester to second-year students had been marred by spurious factors. For example, most individuals had already learned morphological analysis and could

analyse some words as fast as they could recognize a presented analysis. For this reason it was decided to conduct all testing during the first semester of the first year, as soon as it could be assumed that the Cyrillic alphabet had been mastered and some knowledge of the shape of Russian words had been acquired.

EXPERIMENT I

This experiment was designed to test the effect morphological segmentation has on the amount of memorization and retention of Russian vocabulary.

Subjects

Ss were 30 students of first semester Russian at Bucknell and Lehigh Universities, matched by sex and (at Bucknell) by SAT verbal scores, and randomly assigned to experimental and control groups during a regular class period. When the Bucknell experiment confirmed previous findings of no direct correlation between SAT verbal scores and vocabulary assimilation ($r=.147$), SAT matching was discontinued for the Lehigh tests.

Procedure

Each S was given a test booklet containing 10 pages. On each page appeared 1 Russian word with its English translation. The control booklets contained Russian and English

words all in lower case type. The experimental booklets contained Russian and English words segmented into prefixes, stems and suffixes by presenting the stems of both the Russian and English words in upper case type. The Russian and English forms maintained a one-to-one relationship according to lower case and upper case morphemes. The order of the morphemic correlation sometimes varied, e.g.

1. zaRABOTat'

begin-to-WORK

but there were never more or fewer English morphemes than there were Russian ones and the stems always corresponded directly. Where no one-to-one morpheme translation was obvious, such a translation was provided in parenthesis, e.g.

2. podSVEČnik

CANDLEholder
(under-CANDLE-thing)

The Ss were exposed to the booklets three times. After each of the three memorization trials, they were given a list of the English words, unsegmented, and asked to recall as much of the corresponding Russian word as possible. After the completion of three trials, the Bucknell Ss switched conditions. The experimental group was run in control condition with unsegmented words and the control group was run in the experimental condition with segmented ones. Again the Ss were presented with a list

of unsegmented English correlates and asked to recall the Russian.

Scoring each of these trials was based on the number of correct morphemes or parts of morphemes recalled in response to each English cue word. The cue words, English correlates from the test booklets repeated in random order, were all unsegmented in the recall routine. A single point was assigned for the recall of a complete morpheme. Partial morpheme recall was scored by crediting the fraction of the whole represented by the number of letters written on the recall test by the S. There were a total of 28 morphemes, 21 different ones, on the test.

Results

The Bucknell data graphed in Figure 1, clearly illustrates that the group who initially received the segmented words attained a greater retention level consistently, in each trial, than did the control group, who received the words unsegmented in the first 3 trials. While there was a consistent difference between the two groups, only trials 1, 3 and 4 reached statistical significance: $t(1,7) = 2.542$, $p < .05$; $t(1,7) = 2.37$, $p < .05$: $t(1,7) = 2.624$, $p < .05$, respectively.

While the Lehigh data approaches statistical significance ($p > .05$ in all cases), it does not quite reach significance. Still it is clear from Figure 2 that the Lehigh data does indeed parallel the Bucknell data. The experimental group consistently performs at a higher level than the control group. At the completion of 3 trials, the experimental group averaged

Figure 1
Bucknell Data

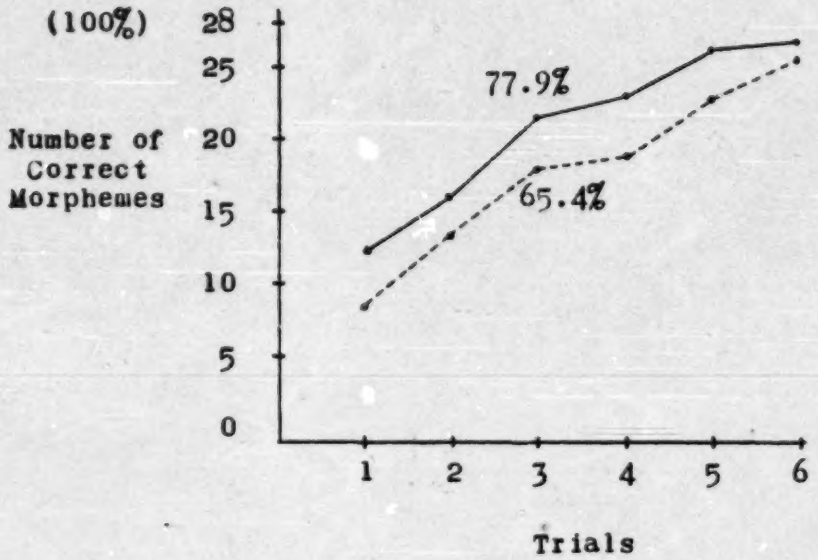
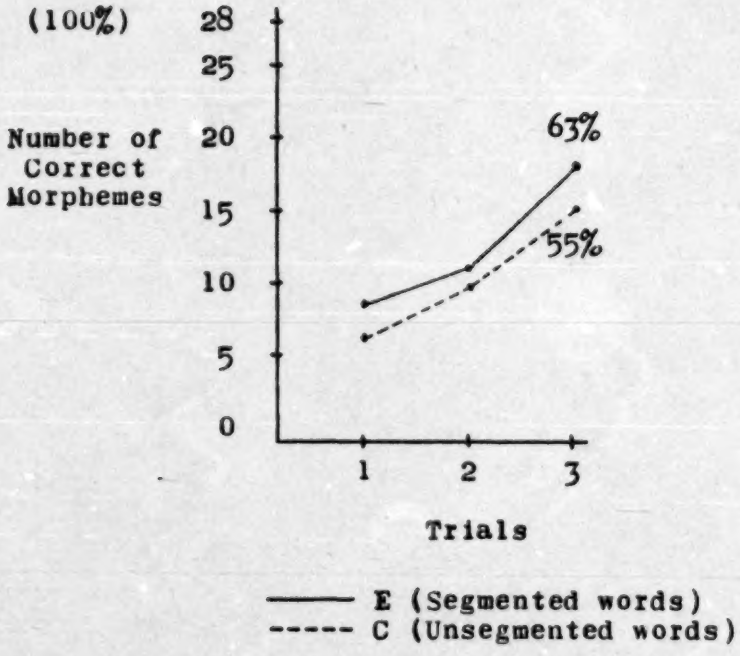


Figure 2
Lehigh Data



a score of 63% compared to a score of 55% for the control group (after 1 trial, E = 31.2%, C = 22.9%; after 2 trials, E = 40.7%, C = 35.7%).

EXPERIMENT II

This experiment was designed to test the capacity of students instructed in morphological analysis and with a mastery of the appropriate morphemes to recognize new words composed of familiar morphemes and associate them with a single, complex English translation.

Procedure

Following the three trials of the memorization test, the 14 Ss of the Lehigh group were presented with a single sheet containing 7 unfamiliar Russian words consisting of familiar morphemes. Each Russian word was accompanied by a multiple choice of 4 English correlates. Each set of correlates was designed so that one was a perfect translation, another contained a translation of two out of three morphemes, a third translated one of a possible three morphemes and a fourth was a reasonable choice within the range of morphemic meanings

covered by the entire test, but which was unrelated to the given Russian example, e.g.

3. pereučit'

___underreading [0 points]
___rereading [1 point]
___to reteach [3 points]
___to underteach [2 points]

Ss were instructed to mark the appropriate translation. Not all the examples presented English translations which contained morphemes in one-to-one correlation to the Russian. Two of the examples required an additional step of mentation between the recognition of the Russian word and correlation with the English translation:

4. podokonnik

___watering [0 points]
___submarine [2 points]
___window washer [1 point]
___window sill [3 points]

Assuming that the experimental Ss had learned to associate individual Russian morphemes pod- with 'under, sub-', -okón- with 'window' and -nik with 'thing', direct translation provides them with 'under-window-thing' which more closely approaches 'window sill' than any of the other alternatives. Assuming that the control Ss have learned to distinguish morpheme boundaries much less clearly, they will not be able to find

sharp one-to-one correlations among the alternative translations and will be forced to guess at a larger number of factors. If the experimental Ss have a stronger sense of Russian morphemic organization, and assuming morphemic analysis assists in recognizing the meanings of unfamiliar words, the experimental group should perform better on this more complex task. Scoring this test again was 1 point per correctly recognized morpheme.

Results

The difference between experimental and control groups did not reach statistical significance [$F(1, 12) = 1.75$, $p > .05$] in this experiment. The experimental group did, however, achieve higher scores on the multiple choice test, an average of 79.3% as compared to 64.3% for the control group. The 18.9% difference between the Lehigh groups is even greater than the 12.7% difference between the same groups' performance on the memorization test.

Discussion

Although the differences were not on the whole significant, the performance of the experimental groups was consistently better than that of the control groups. Both at Bucknell and at Lehigh, the groups exposed to morphologically segmented words demonstrated greater powers of recall--to a statistically significant degree in the Bucknell test. At

both universities, the experimental group's performance dropped during the second trial, then recovered during the third, for reasons still unknown. The performance of the control group in the Bucknell experiment dropped in comparison to the experimental group in the fourth trial. This was due to the fact that the conditions were switched and the control group was confronted with, and to some extent confused by, sectioned words. What is interesting here, however, is that the switch to unsegmented words affected the experimental group comparatively less. We interpret this to indicate that once sectioning is mastered, it continues to be effective as a learning device even when sectioned words are no longer available. As the Ss approached the upper limits or ceiling of the test, their performances began to converge, i.e. the control group began to catch up with the experimental in terms of performance. The experimental Ss are approaching their mnemonic capacities while the control Ss are learning at a faster rate how to section words themselves.

It is far less clear to what degree the recall advantage contributes to a capacity to recognize unfamiliar words composed of morphemes already learned. Certainly additional abilities are called upon in this process. The student must analyse the word, attaching meanings to the constituent morphemes, then match his reconstituted meaning with several equally appealing alternatives. In the case of podokonnik mentioned earlier, there is a large gap between the reconstituted meaning and the actual lexical meaning. Nonetheless, there is strong reason to believe that instruction in morphological analysis combined with

the consistent presentation of new lexical items in a morphologically segmented format, gives the student a genuine learning advantage in this area, too. First, because the superior performance of the Lehigh Ss in the second experiment parallels the significantly superior performance of the Bucknell experimental group on the memorization tests. Second, the experimental group outperformed the control group by every measure we can think of. In the special examples which we were closely watching, the experimental group's success outmatched the control group's by almost 2 to 1. For example, 5 out of 7 experimental Ss correctly identified the meaning of podokonnik as 'window sill' while only 3 out of 7 in the control group did so. The experimental group averaged 4.7 perfect answers on the multiple choice test; the control group averaged 2.86. The experimental group averaged only .1 total mistranslations; the control group averaged .6. And there was one other interesting phenomenon: frequently Ss recalled morphemes perfectly on the memorization tests, but recalled them in response to the wrong English cue and/or in the wrong order. Confusing bez- with za- and pod- with do- or -okon- was particularly frequent due to the shared grapheme in each case. Such recalls do reflect the correct memorization of graphemes and graphemic combination, and since Healy 1974 and Bjork and Healy 1974 have convincingly demonstrated that item and order information is stored separately, crediting the memorization of the formative separate from the memorization of order and semantic content would have been justified. But no score

was given for this type of partial recall, since it was unclear what the relation of the semantic content to the formative is. If half credit had been allowed in such instances, the gap would have been widened between the Lehigh groups, though still not enough to have made it significant. Had such credit been allowed for the Bucknell S., the difference between the E and C groups on the first and third trials would have been significant at the 1 % level.

In conclusion we might mention the coincidence of the discontinuation of balancing for SAT verbals and the loss of significance in the difference between the two Lehigh groups. assuming a language learning model similar to that of Carroll 1962, 1963 with three individual factors, (1) aptitude, (2) the ability to understand instructions (general intelligence) and (3) perserverance, SAT verbal scores might control (2), general intelligence. (Of Carroll's two external factors, (4) opportunity, i.e. time allowed and (5) quality of instruction, the former was tightly controlled and the latter was the test variable.) If this is the case, the C group at Lehigh could have been contaminated with a higher rate of ability to understand instructions. Future research might attempt to control more variables, even though significance under controlled conditions supports weaker conclusions on the findings.

We are in a better position now to discuss the scoring of such tests. Understanding morphological organization involves individually memorizing and recalling (1) the relevant

morphemes and (2) their relationship to each other, i.e. ordering. Knowledge of the (written) morpheme, in turn, involves the memorization of (a) its graphemes and their order and (b) the meaning associated with them. A scoring system should credit accurately recall of each of these items separately and at least to some extent discredit guessing. To this we might add that rules governing phonological stem mutations must also, of course, be kept separate. Jarvella and Snodgrass 1974 confirmed what we suspected all along: variant spellings binders recognition of derivational origins, e.g. without previous knowledge of the phonological rules of consonant mutation, we would expect the student to recognize the ruka 'arm' in odnorukij 'one-armed' before he would recognize it in the diminuative ručka. Our materials avoided derivational forms involving stem mutations. With these factors in mind, future research should proceed to test the more complex effects of long-range contact with morphologically sectioned words on vocabulary building among advanced students of Russian. It is important to identify that point in their progress where they can reasonably be expected to undertake derivational sectioning on their own and where it may be discontinued in their language learning materials.

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